

REMARKS

The Office Action of August 24, 2004 has been carefully considered. As a preliminary matter, Applicants agree with the Examiner that "or" should be changed to "and" in claims 16-19, 24 and 25. In order to avoid triggering the requirement of listing the entire claim set, Applicants postpone such amendment to either next office action or, if the case is found allowable, through an Examiner's amendment (if it is agreeable to the Examiner).

The Invention

As discussed in the introduction part of this application, the present invention was made to overcome problems encountered in the existing wastewater treatment systems. For example, comparing to Continuous Activated Sludge Processes (AP), it among other things eliminates the need for separate clarification units by utilizing a fill-and-draw or variable volume operation. Comparing to the existing Sequencing Batch Reactor (SBR), the present invention overcomes the hydraulic limitation with resultant large reactor tank(s) by combining the advantages of activated sludge SBR and biofilm systems. To accomplish this goal, the present invention provides a highly compartmentalized SBR reactor for stage generation together with a programmable controller which, through independent control means for each compartment (or tank), controls reaction conditions for stage generation, including parameters such as time, volume, MLSS concentration, carrier concentration, switching between anoxic and aerobic zones using the carriers, selecting type of biofilm, surface area/growth thickness of biofilm per volume, hydraulic retention time, internal recycle rate, aeration, mixing and water level. Such stage generation method is important in that (i) it allows biofilm carriers to be confined in the designated zones to carry out the designated treatment objective(s) and (ii) it avoids recycling of biofilm carriers from one compartment to the other compartment(s). Through the present invention, the reactor size can be reduced by 50-60% comparing to the conventional SBR. Clearly, reactor computerization, biofilm carriers, a controller and independent control means for stage generation are the essential elements of the present invention, which are specifically recited in system claims 1-20, and required for performing the steps recited in method claims 21-29.

Rejection Under 35 USC Section 102

Claims 1-2, 11-13, 16-17 and 20-25 are rejected under 35 USC section 102(b) as being anticipated by Jones (WO 99/4759).

Jones' system is a continuous process which does not use stage generation where separate compartments of the system cannot be independently controlled in terms of hydraulic retaining time, volume, water level, MLSS concentration, carrier concentration, etc. As a continuous process, Jones' system is necessarily based on one or more separate clarification units for water/sludge separation, rather than based on stage generation through a control unit and independent control means for each individual compartment (or tank) as in the present invention. Not surprisingly, the Jones' system does not have the element needs for practicing the present invention as recited in the claim 1. Specifically, Jones' system lacks the following elements of claim 1:

- b) independently controllable first and second means for stage generation provided for each said first and second tank respectively;
-
- d) a controller for controlling the operation of said first means for stage generation to create a first condition for the selective growth of a first biomass on said carriers within said first tank to form a first sludge.....

It's, too, not surprising that the Examiner had not identified the above two elements in Jones' system.

Similarly, Jones' system fails to perform two of the steps recited in claims 21-29:

-
- b) controlling the operating conditions of the tanks separately such that a first condition is created for growth of a first biomass on said carriers as a first sludge suitable for a first bioreaction stage within the first tank, and a second condition is created for growth of a second biomass on said carriers as a second sludge suitable for a second bioreaction stage within the second tank; and
- c) emptying said wastewater in at least one tank after treatment therein.

As a fundamental patent law principle, if a reference misses even one element recited in a claim, it cannot be an anticipatory reference against that claim. As the Federal Circuit stated, "[a]nticipation requires the disclosure in a single prior art reference of each element of the claim under consideration." *W.L. Gore & Assocs. V. Garlock*, 220 U.S.P.Q. 303, 313

(Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984). Because the Jones reference failed to disclose two of the elements recited in system claims 1-21 and similarly failed to disclose two of the steps recited in method claims 21-29, the anticipatory rejection of the claims based on this reference must be withdrawn.

Rejection Under 35 USC Section 103

Claims 1-29 are rejected under 35 USC section 103(a) as being unpatentable over Kerrn-Jespersen et al in view of Reimann et al.

Applicants respectively submit that the obviousness rejection is improper for any one of the following reasons. First, the missing elements from the primary reference Kerrn-Jespersen et al. (a controller and independently controllable means for stage generation) are not identified or wrongly identified in the secondary reference Reimann et al. Second, no suggestion or motivation is provided for combining these two references.

There are no controller and independent control means for stage generation in the Reimann reference. Although Reinmann disclosed a type of staged operation in separate compartments of a reactor, such staged operation is maintained by using a conveying belt to transfer carriers from one compartment to another, thereby creating a staged process. Contrary to the present invention, it doesn't need a controller and/or independently controllable means for each compartment for more sophisticated stage generation (involving a large number of controllable parameters) for the present invention where carriers are not moved but confined in their respective compartments. By any understandings, the conveying belt cannot be regarded as a controller element and an independently controllable means for each compartment as recited in claims 1-20.

There are no suggestion or motivation to combine the conveying belt of the Reimann reference with the wastewater-purification process disclosed by Kerrn-Jespersen. As mandated by the Federal Circuit, “[o]bviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching suggestion or incentive supporting the combination.” *In re Geiger*, 815 F. 2d 686, 2 USPQ 2d 1276, 1278 (Fed. Cir. 1987). In the present case, there is no suggestion, motivation, or incentive to combine Reimann’s conveying belt with Kerrn-Jespersen’s system. Kerrn-Jespersen required that two separate micro-organism cultures be kept apart from each other in their confined

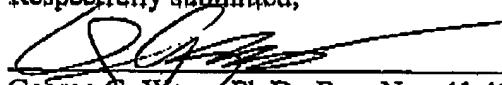
space, one for anaerobic and anoxic treatment and the other for aerobic treatment. In this system, a conveying belt if used as in Reimann would destroy such separation needed in Kerr-Jespersen. This teaches away rather than suggests its application in Kerr-Jespersen. Thus, Kerr-Jespersen and Reimann, either alone or in combination, does not teach or render obvious the present invention because the references failed to teach or suggest a controller and independently controllable means for stage generation in different compartments as recited in claims 1-20. They also failed to teach or suggest the step of generating the type of stages in separate compartment of a reactor as recited in claims 21-19.

Conclusion

In view of the foregoing remarks, Applicants respectfully submit that the present invention is not anticipated by Jones, nor rendered obvious by Kerr-Jespersen et al. in view of Reimann et al. Reconsideration and allowance of the application are earnestly solicited.

It is believed that no additional fees and charges (other than a three-month extension fee, which is submitted concurrently) are required at this time in connection with the application; however, if any fees or charges are required at this time, they may be charged to Fish & Richardson's Patent and Trademark Office Deposit Account No.06-1050.

Respectfully submitted,


George G. Wang, Ph.D., Reg. No.: 41,419
Attorney for Applicant

Wilkinson & Grist
6th Floor, Prince's Building
Charter Road, Hong Kong

Telephone (852) 2905-4786
Telefax (852) 2520-2090